

CLAIMS

1. A process to produce latex polymer particles which is characterized in that polymerization reaction is conducted in an aqueous medium while the aqueous medium is stirred, said aqueous medium comprising:
 - (i) a macromer which has, on one terminal, a polymerizable ethylenic group and, on the other terminal, a hydrophilic polymer segment (which may be terminated with a ligand-introducing group) via or not via a hydrophobic polymer segment,
 - (ii) one or more kinds of latex-forming monomers,
 - (iii) a polymerization initiator, and
 - (iv) optionally a magnetic body or a label.
2. A process of claim 1 wherein polymerization initiator is a redox initiator.
3. A process of claim 2 wherein a magnetic body or a label is present.
4. A process of claim 2 wherein hydrophilic polymer segment is a segment originated from a water-soluble polymer selected from the group consisting of poly(ethyleneglycol), poly(vinylalcohol), poly(vinylpyrrolidone), poly(dextran), poly(dextrin) and gelatin, and wherein hydrophobic segment is originated from a scarcely water-soluble polymer selected from the group consisting of poly(lactide), poly(ϵ -caprolactone), poly(α - and/or β -benzyl aspartic acid) and poly(γ -benzyl glutamic acid).
5. A process of claim 2 wherein macromer has no hydrophobic polymer segment, and wherein hydrophilic polymer segment is originated from poly(ethyleneglycol).
6. A process of claim 2 wherein macromer has no hydrophobic segment, and wherein poly(ethyleneglycol) segment on the other

terminal is terminated with a group selected from the group consisting of hydroxyl group, carboxyl group, sulfo group, aldehyde group, amino group, imino group, mercapto group, active ester-type protected hydroxyl group, active ester-type protected carboxyl group, acetal-type protected aldehyde group, organic sulfonyl-protected hydroxyl group, reactivity-protected amino group and C₁-C₄ alkoxyl group.

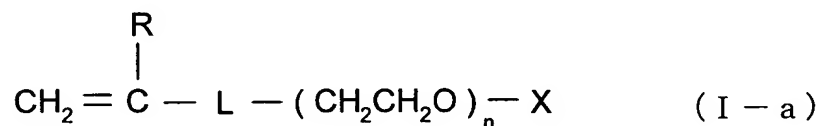
7. A process of claim 1 wherein polymerization reaction is conducted with the co-existence of latex particles which have previously been formed with use of latex-forming monomers as mentioned in (ii).

8. A process of claim 7 wherein latex-forming monomer is selected from the group consisting of styrene, α -methylstyrene, *p*-bromostyrene, vinyltoluene, 1-vinylnaphthalene, C₁-C₄ alkyl (meth)acrylate and divinylbenzene.

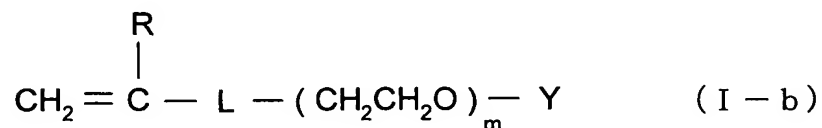
9. A process of claim 7 wherein a magnetic body is present.

10. A process of claim 7 wherein magnetic body has been treated to be hydrophobic.

11. A process of claim 1 or 2 wherein two kinds of macromers exist, the first macromer having formula (I-a) as follows:



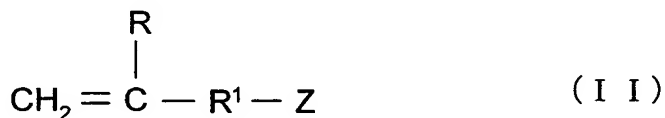
and, the second macromer having formula (I-b) as follows:



wherein R independently denotes a hydrogen atom or an alkyl group having 1 to 3 carbon atoms; L independently denotes $(\text{CH}_2)_a\text{O}$, COO , OCO , CONH , $(\text{CH}_2)_a\text{NH}$, phenylene (C_6H_4), phenyleneoxy ($\text{C}_6\text{H}_4\text{O}$), oxyphenylene (OC_6H_4), benzyloxy ($\text{C}_6\text{H}_4\text{CH}_2\text{O}$) or oxybenzyl ($\text{OCH}_2\text{C}_6\text{H}_4$) (a denotes an integer of 1 to 3; each group is to be incorporated in the above formula in the direction as mentioned); n denotes an integer of 11 to 10,000; m denotes an integer which, in connection with each n, is smaller than n by at least 10; X (or a group with which poly(ethyleneglycol) sement is terminated) denotes a group selected from the group consisting of hydroxyl group, carboxyl group, sulfo group, aldehyde group, amino group, imino group, active ester-type protected hydroxyl group, active ester-type protected carboxyl group and acetal-type protected aldehyde group each of which is bound via or not via $(\text{CH}_2)_b$ or $\text{CO}(\text{CH}_2)_b$; and Y denotes either an alkyl group having 1 to 6 carbon atoms which may be substituted with halogen atom or a benzyl group whose benzene ring may be substituted with a halogen or an alkyl or alkoxyl group having 1 to 3 carbon atoms.

12. A process of claim 11 wherein one or more kinds of latex-forming monomers are selected from the group consisting of styrene, α -methylstyrene, *p*-bromostyrene, vinyltoluene, 1-vinylnaphthalene, C_1 - C_4 alkyl (meth)acrylate and divinylbenzene.

13. A process of claim 1 or 2 wherein there co-exists another monomer of formula (II):



wherein R denotes a hydrogen atom or an alkyl group having 1 to 3 carbon atoms;

R^1 denotes a single bond, $(\text{CH}_2)_a$, $\text{CH}=\text{CH}$, COO , OCO , CONH , $(\text{CH}_2)_a\text{NH}$, phenylene (C_6H_4), phenyleneoxide ($\text{C}_6\text{H}_4\text{O}$),

oxyphenylene (OC_6H_4), benzyloxy ($\text{C}_6\text{H}_4\text{CH}_2\text{O}$) or oxybenzyl ($\text{OCH}_2\text{C}_6\text{H}_4$) (a denotes an integer of 1 to 3; each group is to be incorporated in the above formula in the direction as mentioned); and

Z denotes a group selected from the group consisting of amino group, carboxyl group, cyano group, amide group, urethane group and urea group.

14. A process of claim 2 wherein a magnetic body exists.
15. A process of claim 14 wherein magnetic body has been treated to be hydrophobic.
16. A process of claim 1 wherein either a magnetic body or a label is non-existent.
17. A process to produce latex polymer particles which is characterized in that latex polymer particles are produced by the process of claim 16; said latex polymer particles are dipped in a liquid which is capable of swelling the latex particles, and which contains magnetic particles or label suspended therein; subsequently, the latex particles are shrunk; and, thus, magnetic particles or label is mixed in the latex polymer particles.
18. Polymer latex particles, as a high-polymer material, having an average particle size of 0.01 to 5 μm when measured by a dynamic light scattering photometer (DLS), and in which their surface layer (shell) domain has hydrophilic polymer segment, said latex polymer particles being produced by the polymerization of:
 - (a) 0.5 to 99.5 % by weight of macromer which has, on one terminal, a polymerizable ethylenic group and, on the other terminal, a hydrophilic polymer segment (which may be terminated with a ligand-introducing group) via or not via a hydrophobic polymer segment, and
 - (b) 0.5 to 99.5 % by weight of one or more kinds of latex-forming

monomer,
based on the weight of total monomer used.

19. Latex particles of claim 18 wherein magnetic body or label is mixed in the nucleus (core) domain of the particles.

20. Latex particles of claim 18 or 19 wherein 3 to 97 % by weight, based on the weight of latex-forming monomer b), of latex-forming monomer b) has previously been used for forming latex particles.

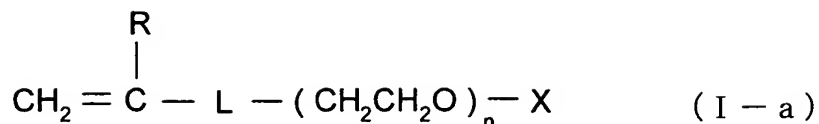
21. Latex particles of claim 18 wherein magnetic body is adhered to, or mixed in, latex particles which essentially comprise latex-forming monomer, and wherein at least a polymer segment originated from macromer a) or latex-forming monomer b) exists on the surface of said latex particles.

22. Latex particles of claim 21 wherein hydrophilic polymer segment of macromer is poly(ethyleneglycol) segment.

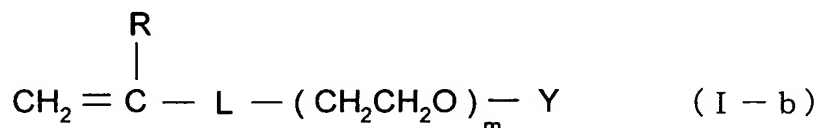
23. Latex particles of claim 18 wherein macromer has no hydrophobic polymer segment, and wherein hydrophilic polymer segment is originated from poly(ethyleneglycol).

24. Latex particles of claim 23 wherein macromer has no hydrophobic segment, and wherein poly(ethyleneglycol) segment on the other terminal is terminated with a group selected from the group consisting of hydroxyl group, carboxyl group, sulfo group, aldehyde group, amino group, imino group, mercapto group, active ester-type protected hydroxyl group, active ester-type protected carboxyl group, acetal-type protected aldehyde group, organic sulfonyl-protected hydroxyl group, reactivity-protected amino group and C₁-C₄ alkoxyl group.

25. Latex particles of claim 24 wherein two kinds of macromers exist, the first macromer having formula (I-a) as follows:



and, the second macromer having formula (I-b) as follows:



wherein R independently denotes a hydrogen atom or an alkyl group having 1 to 3 carbon atoms;

L independently denotes $(\text{CH}_2)_a\text{O}$, COO, OCO, CONH, $(\text{CH}_2)_a\text{NH}$, phenylene (C_6H_4), phenyleneoxy ($\text{C}_6\text{H}_4\text{O}$), oxyphenylene (OC_6H_4), benzyloxy ($\text{C}_6\text{H}_4\text{CH}_2\text{O}$) or oxybenzyl ($\text{OCH}_2\text{C}_6\text{H}_4$) (a denotes an integer of 1 to 3; each group is to be incorporated in the above formula in the direction as mentioned);

n denotes an integer of 11 to 10,000;

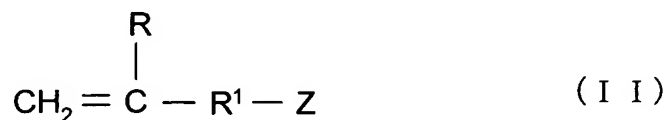
m denotes an integer which, in connection with each n, is smaller than n by at least 10;

X (or a group with which poly(ethyleneglycol) sement is terminated) denotes a group selected from the group consisting of hydroxyl group, carboxyl group, sulfo group, aldehyde group, amino group, imino group, active ester-type protected hydroxyl group, active ester-type protected carboxyl group and acetal-type protected aldehyde group each of which is bound via or not via $(\text{CH}_2)_b$ or $\text{CO}(\text{CH}_2)_b$; and

Y denotes either an alkyl group having 1 to 6 carbon atoms which may be substituted with halogen atom or a benzyl group whose benzene ring may be substituted with a halogen or an alkyl or alkoxyl group having 1 to 3 carbon atoms.

26. Latex particles of claim 25 wherein one or more kinds of latex-forming monomers are selected from the group consisting of styrene, α -methylstyrene, *p*-bromostyrene, vinyltoluene, 1-vinylnaphthalene, C_1 - C_4 alkyl (meth)acrylate and divinylbenzene.

27. Latex particles of claim 23 wherein there co-exists another monomer, from which a high-polymer material is derived, having formula (II):



wherein R denotes a hydrogen atom or an alkyl group having 1 to 3 carbon atoms;

R¹ denotes a single bond, (CH₂)_a, CH=CH, COO, OCO, CONH, (CH₂)_aNH, phenylene (C₆H₄), phenyleneoxide (C₆H₄O), oxyphenylene (OC₆H₄), benzyloxy (C₆H₄CH₂O) or oxybenzyl (OCH₂C₆H₄) (a denotes an integer of 1 to 3; each group is to be incorporated in the above formula in the direction as mentioned); and

Z denotes a group selected from the group consisting of amino group, carboxyl group, cyano group, amide group, urethane group and urea group.

28. Latex particles of claim 24 or 25 wherein ligand is covalently bound via a group with which poly(ethyleneglycol) segment is terminated.

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29. Latex particles of claim 25 or 28 wherein magnetic body is mixed in, and wherein said magnetic body has been treated to be hydrophobic.